IN THE CLAIMS

24.(Currently Amended) A method ~~including the steps of~~ comprising: forming a transition metal oxide having a phase therein which exhibits a superconducting state at a critical temperature ~~in excess of~~ greater than or equal to 26°K,

maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase, ~~and~~

passing an electrical supercurrent through said transition metal oxide while it is in said superconducting state[[.]] , and

said composition comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

25. (Original) The method of claim 24, where said transition metal oxide is comprised of a transition metal capable of exhibiting multivalent states.

26. (Original) The method of claim 24, where said transition metal oxide is comprised of a Cu oxide.

86. (Currently Amended) A method, comprising: ~~the steps of~~:

forming a composition including a transition metal, a rare earth or rare earth-like element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than 26°K,

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K, and

passing an electrical current through said composition while said composition is in said superconducting state.

87. (Original) The method of claim 86, where said transition metal is copper.

88. (Currently Amended) A method~~, including the steps of~~ comprising:

forming a composition exhibiting a superconductive state at a temperature in excess of 26°K, maintaining said composition at a temperature ~~in excess of~~ greater than or equal to 26°K at which temperature said composition exhibits said superconductive state, ~~and~~

passing an electrical current through said composition while said composition is in said superconductive state[[.]] ,and

said composition comprising a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

89. (Currently Amended) The method of claim 88, where said composition is comprised of a ~~metal~~ copper oxide.

90. (Original) The metal of claim 88, where said composition is comprised of a transition metal oxide.

96. (Currently Amended) A superconductive method for causing electric current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26 K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprising a ~~copper-oxide~~ compound having a layer-type perovskite-like crystal structure, the

composition having a superconductor transition temperature T_c of greater than 26 K;

(b) maintaining the superconductor element at a temperature ~~above~~ greater than or equal to 26 K and below the superconductor transition temperature T_c of the superconductive composition; ~~and~~

(c) causing an electric current to flow in the superconductor element[[.]] and

(d) said composition comprising a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

97. (Currently Amended) The superconductive method according to claim 96 in which the compound of the superconductive composition ~~includes~~ comprises at least one rare-earth or rare-earth-like element and at least one alkaline-earth element.

98. (Previously Presented) The superconductive method according to claim 97 in which the rare-earth or rare-earth-like element is lanthanum.

99. (Previously Presented) The superconductive method according to claim 97 in which the alkaline-earth element is barium.

100. (Currently Amended) The superconductive method according to claim 96 in which the ~~copper-oxide~~ compound of the superconductive composition includes mixed valent ~~copper~~ <u>transition metal</u> ions.

101. (Currently Amended) The superconductive method according to claim 100 in which the ~~copper-oxide~~ compound ~~includes~~ <u>comprises</u> at least one element in a nonstoichiometric atomic proportion.

102. (Currently Amended) The superconductive method according to claim 101 in which oxygen is present in the ~~copper-oxide~~ compound in a nonstoichiometric atomic proportion.

103. (Previously Presented) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ <u>comprising</u> ~~a copper-oxide compound having~~ a layer-type perovskite-like crystal structure, ~~the copper-oxide compound including at least one rare-earth or rare-earth-like element and~~

~~at least one alkaline-earth element~~ the composition comprising a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements. , the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$, the transition-onset temperature T_c being greater than 26 K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

104. (Previously Presented) The superconductive method according to claim 103 in which the rare-earth or rare-earth-like element is lanthanum.

105. (Previously Presented) The superconductive method according to claim 103 in which the alkaline-earth element is barium.

106. (Currently Amended) The superconductive method according to claim 103 in which the ~~copper-oxide~~ compound of the superconductive composition includes mixed valent copper ions.

107. (Previously Presented) The superconductive method according to claim 106 in which ~~the copper-oxide~~ compound is a the copper-oxide ~~includes~~ comprising at least one element in a nonstoichiometric atomic proportion.

108. (Previously Presented) The superconductive method according to claim 107 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

109. (Currently Amended) A method ~~including the steps of~~ comprising:

forming copper oxide having a phase therein which exhibits a superconducting state at a critical temperature ~~in excess of~~ greater than or equal to 26°K; maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide ~~includes at least one element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element.~~ at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

110. (Currently Amended) A method comprising ~~the steps of~~:

forming a composition including copper, oxygen and an element selected from the group consisting of a Group II A element, a rare earth element, a rare-earth-like element, an alkaline earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

111. (Currently Amended) A method ~~including the steps of comprising;~~:

forming a composition exhibiting a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining said composition at a temperature ~~in excess of~~ greater than or equal to 26°K at which temperature said composition exhibits said superconductive state;

passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and an element selected from the group consisting of Group II A element, a rare earth element a rare earth like element, an alkaline earth element and a Group III B element.

112.(Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition

having a superconductive transition temperature T_c of greater than <u>or equal to</u> 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, a rare earth element<u>, a rare earth like element; an alkaline earth element, a Group IIA element</u> and a Group III B element;

(b) maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

113. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ <u>comprising</u> a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element<u>, a rare earth like element, an alkaline earth element , a Group IIA element</u> and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit

defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$, the transition-onset temperature T_c being greater than or equal to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

114. (Currently Amended) A method ~~including the steps of~~ comprising:

forming copper oxide having a phase therein which exhibits a superconducting state at a critical temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from the group consisting of a Group II A element ~~and at least one element selected from the~~

~~group consisting of~~ a rare earth element, a rare earth like element, an alkaline earth element, a Group IIA element and a Group III B element.

115. (Currently Amended) A method comprising the steps of:

forming a composition including copper, oxygen and an element selected from the group consisting of at least one Group II A element ~~and at least one element selected from the group consisting of~~ a rare earth element, a rare earth like element, an alkaline earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

116. (Currently Amended) A method including the steps of:

forming a composition exhibiting a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining said composition at a temperature ~~excess of~~ greater than or equal to 26°K at which temperature said composition exhibits said superconductive state;

passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a copper oxide and at least one element selected from the group consisting of Group II A ~~and at least one element selected from the group consisting of~~ , a rare earth element, a rare earth like element, and an alkaline earth element and a Group III B element.

117. (Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprisingU a copper-oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature T_c of greater than or equal to 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element ~~and at least one~~

~~element selected from the group consisting of~~, a rare earth element, a rare earth like element, and alkaline earth element and a Group III B element;

(b) maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

118. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprises a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element ~~and at least one element selected from the group consisting of~~ a rare earth element a rare earth like element, an alkaline earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-

resistivity intercept temperature $T_{p=0}$, the transition-onset temperature T_c being greater than or equal to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

119. (Currently Amended) A method ~~including the steps of~~ comprising:

forming a transition metal oxide having a phase therein which exhibits a superconducting state at a critical temperature in excess of 26°K;

maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

passing an electrical ~~supercurrent~~ superconducting current through said ~~copper~~ transition metal oxide while it is in said superconducting state;

said transitional metal oxide includes at least one element selected from the group consisting of a Group II A element ~~and at lest one element selected from~~

~~the group consisting of~~, a rare earth element, a rare earth like elememnt, an alkaline earth element and a Group III B element.

120. (Currently Amended) A method comprising ~~the steps of~~:

forming a composition including a transition metal, oxygen and an element selected from the group consisting of at least one Group II A element ~~and at least one element selected from the group consisting of~~ a rare earth element, a rare earth like element, an alkaline earth element and a Group III B element, where said composition is a mixed transitional metal oxide formed from said transition metal and said oxygen, said mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

121. (Currently Amended) A method ~~including the steps of~~ comprising:

forming a composition exhibiting a superconductive state at a temperature ~~in excess of~~ or equal to 26°K;

maintaining said composition at a temperature ~~in excess of~~ greater than or equal to 26°K at which temperature said composition exhibits said superconductive state;

passing an electrical current through said composition while said composition is in said superconductive state; and

said composition including a transitional metal oxide and at least one element selected from the group consisting of Group II A ~~element and at least one element selected from the group consisting of~~ a rare earth element, a rare eath like element, an alkaline earth element and a Group III B element.

122. (Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprising a transition metal oxide compound having a layer-type perovskite-like crystal structure, the composition having a superconductive transition temperature T_c of greater than or equal to 26°K, said superconductive composition includes at least one element

selected from the group consisting of a Group II A element ~~and at least one element selected from the group consisting of~~ , a rare earth element, a rare earth like element, an alkaline earth element and a Group III B element;

(b) maintaining the superconductor element at a temperature ~~above~~ greater than or equal to 26°K and below the superconductor transition T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

123. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprising a transition metal-oxide compound having a layer-type perovskite-like crystal structure, the transition metal-oxide compound including at least one element selected from the group consisting of a Group II A element ~~and at least one element selected from the group consisting of~~ , a rare earth element, a rare earth like element, an alkaline earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity

intercept temperature $T_{\rho=0}$, the transition-onset temperature T_c being greater than or equal to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

124. (Currently Amended) A method ~~including the steps of~~ comprising:

forming copper oxide having a phase therein which exhibits a superconducting state at a critical temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining the temperature of said material at a temperature less than said critical temperature to produce said superconducting state in said phase;

passing an electrical supercurrent through said copper oxide while it is in said superconducting state;

said copper oxide includes at least one element selected from group consisting of a Group II A element, ~~at least one element selected from the group consisting~~

~~of~~ , a rare earth element, a rare earth like element, an alkaline earth element and ~~at least one element selected from the group consisting of~~ a Group III B element.

125. (Currently Amended) A method comprising ~~the steps of~~:

forming a composition ~~including~~ comprising copper, oxygen and ~~an element selected from the group consisting of~~ at least one Group II A element, ~~and~~ at least one ~~element selected from the group consisting of a~~ rare earth element or rare earth like element, at least one alkaline earth element and at least one ~~element selected from the group consisting of a~~ Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

126.(Currently Amended) A method ~~including the steps of~~ comprising:

forming a composition exhibiting a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining said composition at a temperature in ~~excess of~~ greater than of equal to 26°K at which temperature said composition exhibits said superconductive state;

passing an electrical current through said composition while said composition is in said superconductive state; and

said composition ~~including~~ comprising a copper oxide and at least one element selected from the group consisting of Group II A element~~, at least one element selected from the group consisting of~~ , a rare earth element, a rare earth like element, and alkaline earth element and ~~at least one element selected from the group consisting of~~ a Group III B element.

127. (Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprising a copper-oxide compound having a layer-type perovskite-like crystal structure, the

composition having a superconductive transition temperature T_c of greater than or equal to 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, ~~at least one element selected from the group consisting of~~ a rare earth element, a rare earth like element and ~~at least one element selected from the group consisting of~~ a Group III B element;

(b) maintaining the superconductor element at a temperature ~~above~~ greater than or equal to 26°K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

128. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a layer-type perovskite-like crystal structure, the copper-oxide compound ~~including~~ comprising at least one ~~element selected from the group consisting of a group~~ Group II A element, at least one a rare earth element or rare earth like elememnt and at least one ~~element selected from the group consisting of a~~ Group III B element, the composition having a superconductive-

resistive transition temperature defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$, the transition-onset temperature T_c being greater than or equal to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

129. (Currently Amended) A method comprising: providing a composition having a transition temperature greater than or equal to 26°K, the composition ~~including a rare earth or alkaline earth element~~ comprising, a transition metal element capable of exhibiting multivalent states and oxygen, including at least one phase that exhibits superconductivity at temperature ~~in excess of~~ greater than or equal to 26°K, maintaining said composition at said temperature to exhibit said superconductivity and passing an electrical superconducting current through said composition with said phrase exhibiting said superconductivity and said superconducting transition metal oxide comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth

elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

130. (Currently Amended) A method comprising: providing a superconducting transition metal oxide having a superconductive onset temperature greater than or equal to 26°K, maintaining said superconducting transition metal oxide at a temperature less than said superconducting onset temperature, ~~and~~ flowing a superconducting current therein and said superconducting transition metal oxide comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

131. (Currently Amended) A method comprising: providing a superconducting copper oxide having a superconductive onset temperature greater than or equal to 26°K, maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and flowing a superconducting current in said superconducting copper oxide and said superconducting copper oxide comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements

and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

132. (Currently Amended) A method comprising: providing a superconducting oxide composition having a superconductive onset temperature greater than or equal to 26°K, maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and flowing a superconducting current therein, said superconducting oxide composition composition comprising at least one each of rare earth element or rare earth like , an alkaline earth element, and copper.

133. (Currently Amended) A method comprising: providing a superconducting copper oxide composition having a superconductive onset temperature greater than or equal to 26°K, maintaining said superconducting copper oxide at a temperature less than said superconducting onset temperature and flowing a superconducting electrical current therein, said composition comprising at least one each of a Group III B element, an alkaline earth, and copper.

134. (Currently Amended) A method comprising: flowing a superconducting electrical current in a transition metal oxide having a T_c greater than or equal to 26°K ~~and~~, maintaining said transition metal oxide at a temperature less than said T_c and said transition metal oxide comprises at least one element selected from the group consisting of a first element group, a second element group and

combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

135. (Currently Amended) A method comprising: flowing a superconducting current in a copper oxide having a T_c greater than or equal to 26°K and maintaining said copper oxide at a temperature less than said T_c. and said superconducting copper oxide comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements

136. (Currently Amended) A method comprising the steps of:

forming a composition of the formula Ba_xLa_{x-5}, Cu_5O_Y, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature ~~in excess of~~ greater than or equal to 26°K;

maintaining the temperature of said composition at a temperature less than said critical temperature to induce said superconducting state in said metal oxide phase; and

passing an electrical current through said composition while said metal oxide phase is in said superconducting state.

137. (Currently Amended) A method comprising flowing a superconducting electrical current in a composition of matter having a T_c greater than or equal to 26°K, said composition comprising at least one each of a III B element, an alkaline earth, and copper oxide and maintaining said composition of matter at a temperature less than or equal to said T_c.

138. (Currently Amended) A method comprising flowing a superconducting electrical current in a composition of matter having a T_c greater than or equal to 26°K, said composition comprising at least one each of a rare earth, alkaline earth, and copper oxide and maintaining said composition of matter at a temperature less than said T_c.

139. (Currently Amended) A method comprising: flowing a superconducting electrical current in a composition of matter having a T_c greater than or equal to 26°K, said composition comprising at least one each of a rare earthelement or rare earth like element, and copper oxide and maintaining said composition of matter at a temperature less than said T_c.

140. (Currently Amended) A method comprising: flowing a superconducting electrical current in a composition of matter having a T_c greater than or equal to 26°K carrying, said composition comprising at least one each of a III B element, and copper oxide and maintaining said composition of matter at a temperature less than said T_c.

141. (Currently Amended) A method comprising: flowing a superconducting electrical current in a transition metal oxide comprising a T_c[[>]] greater than or equal to 26°K ~~and~~, maintaining said transition metal oxide at a temperature less than said said T_c and said transition metal oxide comprises at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

142. (Currently Amended) A method comprising: flowing a superconducting electrical current in a copper oxide composition of matter comprising a T_c[[>]] greater than or equal to 26°K ~~and~~, maintaining said copper oxide composition of matter at a temperature less than said T_c and said copper oxide composition comprises at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said

first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements.

143. (Currently Amended) A method, comprising ~~the steps of~~:

forming a composition ~~including~~ comprising a transition metal, a group IIIB element, an alkaline earth element, and oxygen, where said composition is a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K,

maintaining said composition in said superconducting state at a temperature greater than 26°K, and

passing an electrical current through said composition while said composition is in said superconducting state.

144. (Previously Presented) The method of claim 143, where said transition metal is copper.

145. (Currently Amended) A superconductive method for causing electric current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26 K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductor transition temperature T_c of greater than or equal to 26 K and comprising at least one element selected from the group consisting of a first element group, a second element group and combinations thereof, wherein said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements and said second element group comprises alkaline earth elements and Group IIA elements;

b) maintaining the superconductor element at a temperature above 26 K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

146. (Currently Amended) A superconductive method for causing electric current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26 K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide

compound having a substantially layered perovskite crystal structure, the composition having a superconductor transition temperature T_c of greater than <u>or equal to</u> 26 K;

b) maintaining the superconductor element at a temperature above 26 K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element

(d) ~~The superconductive method according to claim 145 in which~~ the copper-oxide compound of the superconductive composition includes at least one element selected from the group consisting of a rare-earth element <u>or rare earth like element</u> and a Group III B element and at least one alkaline-earth element.

147.(Previously Presented) The superconductive method according to claim 146 in which the rare-earth or rare-earth-like element is lanthanum.

148. (Previously Presented) The superconductive method according to claim 146 in which the alkaline-earth element is barium.

149. (Previously Presented) The superconductive method according to claim 145 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

150. (Previously Presented) The superconductive method according to claim 149 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

151. (Previously Presented) The superconductive method according to claim 150 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

152. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a rare-earth element <u>or a reare earth like element</u> and a Group III B element and at least one alkaline-earth element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset

temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$, the transition-onset temperature T_c being greater than or equal to 26 K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

153. (Previously Presented) The superconductive method according to claim 152 in which said at least one element is lanthanum.

154. (Previously Presented) The superconductive method according to claim 152 in which the alkaline-earth element is barium.

155. (Previously Presented) The superconductive method according to claim 152 in which the copper-oxide compound of the superconductive composition includes mixed valent copper ions.

156. (Previously Presented) The superconductive method according to claim 155 in which the copper-oxide compound includes at least one element in a nonstoichiometric atomic proportion.

157. (Previously Presented) The superconductive method according to claim 156 in which oxygen is present in the copper-oxide compound in a nonstoichiometric atomic proportion.

158. (Currently Amended) A superconductive method for causing electric-current flow

in a superconductive state at a temperature ~~in excess of~~ <u>greater than or equal to</u> 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature T_c of greater than <u>or equal to</u> 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, a rare earth element, <u>a rare earth like element, an alkaline earth eleemnt</u> and a Group III B element;

(b) maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

159. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition ~~consisting essentially of~~ comprising a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element, a rare earth element, a rare arth like element, an alkaline earth element and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$, the transition-onset temperature T_c being greater than or equal to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{p=o}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

160. (Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature ~~in excess of~~ greater than or equal to 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature T_c of greater than or equal to 26°K, said superconductive composition includes at least one ~~element selected from the group consisting of a~~ Group II A element and at least one element selected from the group consisting of a rare earth element, a rare earth like element and a Group III B element;

(b) maintaining the superconductor element at a temperature above 26°K and below the superconductor transition temperature T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

161. (Currently Amended) A superconductive method for conducting an electric current

essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a copper-oxide compound having a substantially layered perovskite crystal structure, the copper-oxide compound including at least one element selected from the group consisting of a Group II A element and at least one element selected from the group consisting of a rare earth element <u>or a rare earth like element</u> and a Group III B element, the composition having a superconductive/resistive transition defining a superconductive-resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$, the transition-onset temperature T_c being greater than <u>or equal</u> to 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{p=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

162. (Currently Amended) A superconductive method for causing electric-current flow in a superconductive state at a temperature in excess of 26°K, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal oxide

compound having a substantially layered perovskite crystal structure, the composition having a superconductive transition temperature T_c of greater than <u>or equal to</u> 26°K, said superconductive composition includes at least one element selected from the group consisting of a Group II A element, ~~and at least one element selected from the group consisting of~~ a rare earth element, <u>a rre earth like element, an alkaline arth element</u> and a Group III B element;

(b) maintaining the superconductor element at a temperature above 26°K and below the superconductor transition T_c of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

163. (Currently Amended) A superconductive method for conducting an electric current essentially without resistive losses, comprising:

(a) providing a superconductor element made of a superconductive composition, the superconductive composition consisting essentially of a transition metal-oxide compound having a substantially layered perovskite crystal structure, the transition metal-oxide compound including at least one element selected from <u>each of</u> ~~the group consisting of a~~ Group II A element, ~~and at least one element selected from the group consisting of~~ a rare earth element <u>or rare earth like element, an alkaline earth element</u> and a Group III B element, the composition having a superconductive/resistive transition defining a

superconductive/resistive-transition temperature range between an upper limit defined by a transition-onset temperature T_c and a lower limit defined by an effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$, the transition-onset temperature T_c being greater than <u>or equal to</u> 26°K;

(b) maintaining the superconductor element at a temperature below the effectively-zero-bulk-resistivity intercept temperature $T_{\rho=0}$ of the superconductive composition; and

(c) causing an electric current to flow in the superconductor element.

164. (Previously Presented) A method according to claim 129 wherein said composition comprises a substantially layered perovskite crystal structure.

165. (Previously Presented) A method according to claim 130 wherein said superconducting transistor metal oxide comprises a substantially layered perovskite crystal structure.

166. (Previously Presented) A method according to claim 131 wherein said superconducting copper oxide comprises a substantially layered perovskite crystal structure.

167. (Previously Presented) A method according to claim 132 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

168. (Previously Presented) A method according to claim 133 wherein said superconducting oxide composition comprises a substantially layered perovskite crystal structure.

169. (Previously Presented) A method according to claim 134 wherein said transistor metal oxide comprises a substantially layered perovskite crystal structure.

170. (Previously Presented) A method according to claim 135 wherein said copper oxide comprises a substantially layered perovskite crystal structure.

171. (Previously Presented) A method according to claim 136 wherein said composition comprises a substantially layered perovskite crystal structure.

172. (Previously Presented) A method according to claim 137 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

173. (Previously Presented) A method according to claim 138 wherein said composition of matter comprises substantially layered perovskite crystal structure.

174. (Previously Presented) A method according to claim 139 wherein said composition of matter comprises a substantially layered perovskite crystal structure.

175. (Previously Presented) A method according to claim 140 wherein said composition of matter comprises substantially layered perovskite crystal structure.

176. (Previously Presented) A method according to claim 141 wherein said transistor metal oxide comprises substantially layered perovskite crystal structure.

177. (Previously Presented) A method according to claim 142 wherein said copper oxide composition comprises substantially layered perovskite crystal structure.

CLAIM 178 (New) An method comprising:

providing a composition comprising a transition metal, oxygen and any element selected from the group consisting of a Group II A element, a rare earth element or a rare earth like element and a Group III B element, where said composition is

a mixed transition metal oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 179 (New). An method comprising:

providing a composition comprising a transition metal, oxygen and (1) a rare earth element or a rare earth-like element or a group III B element, and/or (2) an alkaline earth element or a Group IIA element, where said composition exhibits a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

passing an electrical current through said composition while said composition is in said superconducting state.

CLAIM 180 (New) A method according to claim 178 wherein said transition metal is copper.

CLAIM 181 (New) A method according to claim 179 wherein said transition metal is copper.

CLAIM 182 (New). A method comprising:

flowing a superconducting current through a material comprising a T_c greater than or equal to 26°K ,;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 183 (New) A method according to claim 182 further including maintaining said material at a temperature less than or equal to said to said T_C.

CLAIM 184 (New) A method according to claim 182 further including providing a source of current for said superconducting current.

CLAIM 185 (New) A method according to claim 183 further including providing a source of current for said superconducting current.

CLAIM 186 (New) A method according to claim 182 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 187 (New) A method according to claim 183 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 188 (New) A method according to claim 184 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 189 (New) A method according to claim 185 wherein said material is maintained at a temperature less than equal to said T_C and greater than or equal to 26°K.

CLAIM 190 (New) A method according to claim 182 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 591 (New) A method according to claim 183 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 192 (New) A method according to claim 184 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing

said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 193 (New) A method according to claim 185 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth,
rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 194 (New) A structure according to claim 186 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoe's an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 195 (New) A method according to claim 187 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 196 (New) A method according to claim 188 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 197 (New) A method according to claim 189 said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 198 (New) A method according to claim 182, wherein said transition metal is selected from the group consisting of copper, nickel and chromium.

CLAIM 199 (New) A method according to claim 182 wherein said rare earth-like elements include elements include elements comprising a rare earth characteristic.

CLAIM 200 (New) A method according to claim 182 wherein said composition comprises one or more of Be, Mg, Ca, Sr, Ba, Ra, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 201 (New) A method according to claim 182 wherein said composition comprises one or more of one or more of of Be, Mg, Ca, Sr, Ba and Ra and one or more of Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 202(New) A method according to claim 182 wherein said material can be made according to known principles of ceramic science.

CLAIM 203 (New) A method according to claim 182 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound.

CLAIM 204 (New) A method according to claim 182 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent copper compound.

CLAIM 205 (New) A method according to claim 182 wherein said material comprises a multiphase material wherein at least one phase exhibits superconductivity.

CLAIM 206 (New) A method according to claim 182 wherein said method is a method of operation of a structure capable of magnetic levitation.

CLAIM 207 (New) A method according to claim 182 wherein said material comprises at least one element selected from each of said first element group and said second element group.

CLAIM 208 (New) A method according to any one of claims 182 to 206 or 207 wherein said superconducting current is flowing in a structure selected from the group consisting of:

a power generation device,
an electrical power transmission device,
an electrical power transmission element,
a coil,
a magnet,
a plasma device,
a nuclear device,
a nuclear magnetic resonace device,
a nuclear magnetic imaging device,
a magnetic levitation device,
a power gerneation system,
a thermonuclear fusion device,
a switching device,
a Josephson junction device,
an electrical packaging device,
a circuit device,
a electronic instrumentation device,
a train,
a magnetic suceptomoter, and
a magnetometer.

CLAIM 209 (New) A method according to any one of claims 182 to 207or 208 wherein said superconducting current is flowing in a coil comprised of said material.

CLAIM 210 (New) A method according to claim 209 wherein said material possesses substantially zero electrical resistance.

CLAIM 211 (New) A method according to claim 209 wherein said coil possesses substantially zero electrical resistance.

CLAIM 212 A method according to claim 182 where in said superconducting current is flowing in a structure selected from the group consisting of a device, an apparatus, a circuit and a combination.

CLAIM 213 (New) A method according to any one of claims 182 to 211or 212 wherein said material possesses substantially zero electrical resistance.

CLAIM 214 (New) A method according to any one of claims 182 to 207or 208 wherein said material is part of a circuit element, said circuit element has an input capable of receiving an input current and an output capable of outputting an output current through substantially zero electrical resistance. between said input and said output.

CLAIM 215 (New) A method according to claim 214 wherein said material possesses substantially zero electrical resistance.

CLAIM 216 (New) A method according to any one of claims 182 to 207or 208 wherein said superconducting current flows from an input of a circuit element to an output of said circuit element

CLAIM 217 (New) A method according to claim 216 wherein said material possesses substantially zero electrical resistance.

CLAIM 218 (New) A method according to any one of claims 182 to 211or 212 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be carrying said superconducting current.

CLAIM 219 (New) A method according to claim 218 wherein said material possesses substantially zero electrical resistance.

CLAIM 220 (New) A method according to claim 182 to 207or 208 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 221 (New) A method according to claim 220 wherein said material possesses substantially zero electrical resistance.

CLAIM 222 (New) A method according to claim 216 wherein said material is part of said circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 223 (New) A method according to claim 222 wherein said material possesses substantially zero electrical resistance.

CLAIM 224 (New) A method according to any one of claims 182 to 207 or 208 wherein said material is part of a circuit element, said circuit element is capable of carrying a superconducting current flowing therein through substantially zero electrical resistance.

CLAIM 225 (New) A method according to claim 224 wherein said material possesses substantially zero electrical resistance.

CLAIM 226 (New) A method according to claim 209 wherein said coil is carrying said superconducting current flowing therein without a source providing for said superconducting current.

CLAIM 227 (New) A structure according to any one of claims 182 to 207 or 208 wherein said superconducting current is flowing without a source providing for said superconducting current.

CLAIM 228. (New) A method comprising:

flowing a superconducting current through a material having a T_c greater than or equal to 26°K~~.~~;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 229. (New) A method comprising:

flowing a superconducting current through a material with a T_c greater than or equal to 26°K~~.~~;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and group IIA elements.

CLAIM 230. (New) A method comprising:

flowing a superconducting current through a material possessing a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 231 (New) A method according to any one of claims 182, 228, 229 or 230 wherein said rare earth-like elements include elements include elements comprising a rare earth characteristic.

CLAIM 232 (New) A method according to any one of claims 182 to 212, 228, 229 or 230 further including forming said material .

CLAIM 233 A method according to claim 213 further including forming said material.

CLAIM 234 (New) A method according to claim 214 further including forming said material.

CLAIM 235 (New) A method according to claim 215 further including forming said material.

CLAIM 236 (New) A method according to claim 216 further including forming said material.

CLAIM 237 (New) A method according to claim 217 further including forming said material.

CLAIM 238 (New) A method according to claim 218 further including forming said material.

CLAIM 239 (New) A method according to claim 219 further including forming said material.

CLAIM 240 (New) A method according to claim 220 further including forming said material.

CLAIM 241 (New) A method according to claim 221 further including forming said material.

CLAIM 242 (New) A method according to claim 222 further including forming said material.

CLAIM 243 (New) A method according to claim 223 further including forming said material.

CLAIM 244 (New) A method according to claim 224 further including forming said material.

CLAIM 245 (New) A method according to claim 225 further including forming said material.

CLAIM 246 (New) A method according to claim 226 further including forming said material.

CLAIM 247 (New) A method according to claim 227 further including forming said material.

CLAIM 248 (New) A method according to claim 231 further including forming said material.

CLAIM 249 (New) A method according to any one of claims 182 to 212, 228, 229 or 230 further including providing said material .

CLAIM 250 (New) A method according to claim 213 further including providing said material.

CLAIM 251 (New) A method according to claim 214 further including providing said material.

CLAIM 252 (New) A method according to claim 215 further including providing said material.

CLAIM 253 (New) A method according to claim 216 further including providing said material.

CLAIM 254 (New) A method according to claim 217 further including providing said material.

CLAIM 255 (New) A method according to claim 218 further including providing said material.

CLAIM 256 (New) A method according to claim 219 further including providing said material.

CLAIM 257 (New) A method according to claim 220 further including providing said material.

CLAIM 258 (New) A method according to claim 221 further including providing said material.

CLAIM 259 (New) A method according to claim 222 further including providing said material.

CLAIM 260 (New) A method according to claim 223 further including providing said material.

CLAIM 261 (New) A method according to claim 224 further including providing said material.

CLAIM 262 (New) A method according to claim 225 further including providing said material.

CLAIM 263 (New) A method according to claim 226 further including providing said material.

CLAIM 264 (New) A method according to claim 227 further including providing said material.

CLAIM 265 (New) A method according to claim 231 further including providing said material.

CLAIM 266 (New) A method according to any one of claims 182, 228, 229 or 230 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains.

CLAIM 267 (New) A method according to any one of claims 182, 228, 229 or 230 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains.

CLAIM 268 (New) An method comprising:

maintaining a composition in a superconducting state at a temperature greater than or equal to 26°K;

said composition posseses an electrical current passing through said composition while said composition is in said superconducting state; and

said composition comprising a transition metal, oxygen and any element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K.

CLAIM 269 (New). An method comprising:

maintaining a composition in a superconducting state at a temperature greater than or equal to 26°K;

said composition posseses an electrical current passing through said composition while said composition is in said superconducting state; and

said composition comprising a transition metal, oxygen and (1) a rare earth element or a rare earth-like element or a group III B element, and/or (2) an alkaline earth element or a Group IIA element, where said composition exhibits a superconducting state at a temperature greater than or equal to 26°K.

CLAIM 270 (New) A method according to claim 268 wherein said transition metal is copper.

CLAIM 271 (New) A method according to claim 269 wherein said transition metal is copper.

CLAIM 272. (New) A method comprising:

applying the magnetic field or the substantially zero resistance to the flow of electrical current of a material comprising a superconducting current flowing therein, said material comprising a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 273 (New) A method according to claim 272 further including maintaining said material at a temperature less than or equal to said to said T_C.

CLAIM 274 (New) A method according to claim 272 further including providing a source of current for said superconducting current.

CLAIM 275 (New) A method according to claim 273 further including providing a source of current for said superconducting current.

CLAIM 276 (New) A method according to claim 272 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 277 (New) A method according to claim 273 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 278 (New) A method according to claim 274 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 279 (New) A method according to claim 275 wherein said material is maintained at a temperature less than equal to said T_C and greater than or equal to 26°K.

CLAIM 280 (New) A method according to claim 272 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the

amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 281 (New) A method according to claim 273 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 282 (New) A method according to claim 274 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 283 (New) A method according to claim 275 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth,
rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 284 (New) A structure according to claim 276 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 285 (New) A method according to claim 277 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 286 (New) A method according to claim 278 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 287 (New) A method according to claim 279 said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 288 (New) A method according to claim 272, wherein said transition metal is selected from the group consisting of copper, nickel and chromium.

CLAIM 289 (New) A method according to claim 272 wherein said rare earth-like elements include elements include elements comprising a rare earth characteristic.

CLAIM 290 (New) A method according to claim 272 wherein said composition comprises one or more of Be, Mg, Ca, Sr, Ba, Ra, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 291 (New) A method according to claim 272 wherein said composition comprises one or more of one or more of of Be, Mg, Ca, Sr, Ba and Ra and one or more of Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 292 (New) A method according to claim 272 wherein said material can be made according to known principles of ceramic science.

CLAIM 293 (New) A method according to claim 272 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound.

CLAIM 294 (New) A method according to claim 272 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent copper compound.

CLAIM 295 (New) A method according to claim 272 wherein said material comprises a multiphase material wherein at least one phase exhibits superconductivity.

CLAIM 296 (New) A method according to claim 272 wherein said method is a method of operation of a structure capable of magnetic levitation.

CLAIM 297 (New) A method according to claim 272 wherein said material comprises at least one element selected from each of said first element group and said second element group.

CLAIM 298 (New) A method according to any one of claims 272 to 296 or 297 wherein said superconducting current is flowing in a structure selected from the group consisting of:

a power generation device,
an electrical power transmission device,
an electrical power transmission element,
a coil,
a magnet,
a plasma device,
a nuclear device,
a nuclear magnetic resonace device,
a nuclear magnetic imaging device,
a magnetic levitation device,
a power gerneation system,
a thermonuclear fusion device,
a switching device,
a Josephson junction device,
an electrical packaging device,
a circuit device,
a electronic instrumentation device,
a train,
a magnetic suceptomoter, and
a magnetometer.

CLAIM 299 (New) A method according to any one of claims 272 to 297 or 298 wherein said superconducting current is flowing in a coil comprised of said material.

CLAIM 300 (New) A method according to claim 299 wherein said material possesses substantially zero electrical resistance.

CLAIM 301 (New) A method according to claim 299 wherein said coil possesses substantially zero electrical resistance.

CLAIM 302 (New) A method according to claim 272 where in said superconducting current is flowing in a structure selected from the group consisting of a device, an apparatus, a circuit and a combination.

CLAIM 303 (New) A method according to any one of claims 272 to 301 or 302 wherein said material possesses substantially zero electrical resistance.

CLAIM 304 (New) A method according to any one of claims 272 to 301 or 302 wherein said material is part of a circuit element, said circuit element has an input capable of receiving an input current and an output capable of outputting an output current through substantially zero electrical resistance. between said input and said output.

CLAIM 305 (New) A method according to claim 304 wherein said material possesses substantially zero electrical resistance.

CLAIM 306 (New) A method according to any one of claims 272 to 280 or 281 wherein said superconducting current flows from an input of a circuit element to an output of said circuit element.

CLAIM 307 (New) A method according to claim 306 wherein said material possesses substantially zero electrical resistance.

CLAIM 308 (New) A method according to any one of claims 272 to 301 or 302 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be carrying said superconducting current.

CLAIM 309 (New) A method according to claim 308 wherein said material possesses substantially zero electrical resistance.

CLAIM 310 (New) A method according to claim 272 to 297 or 298 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 311 (New) A method according to claim 300 wherein said material possesses substantially zero electrical resistance.

CLAIM 312 (New) A method according to claim 306 wherein said material is part of said circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 313 (New) A method according to claim 312 wherein said material possesses substantially zero electrical resistance.

CLAIM 314 (New) A method according to any one of claims 272 to 297 or 298 wherein said material is part of a circuit element, said circuit element is capable of carrying a superconducting current flowing therein through substantially zero electrical resistance.

CLAIM 315 (New) A method according to claim 314 wherein said material possesses substantially zero electrical resistance.

CLAIM 316 (New) A method according to claim 299 wherein said coil is carrying said superconducting current flowing therein without a source providing for said superconducting current.

CLAIM 317 (New) A method according to any one of claims 272 to 297 or 298 wherein said superconducting current is flowing without a source providing for said superconducting current.

CLAIM 318 (New). A method comprising:

applying the magnetic field or the substantially zero resistance to the flow of electrical current of a material comprising a superconducting current flowing therein, said material having a T_c greater than or equal to 26°K;

said superconductive property is selected from the group consisting of the magnetic field caused by said superconducting current, the substantially zero resistance to the flow of said superconducting current and combinations thereof;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 319 (New). A method comprising:

applying the magnetic field or the substantially zero resistance to the flow of electrical current of a material comprising a superconducting current flowing therein, said material with a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 320 (New). A method comprising:

applying the magnetic field or the substantially zero resistance to the flow of electrical current of a material comprising a superconducting current flowing therein, said material possessing a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 321 (New) A method according to any one of claims 272, 319 or 320 wherein said rare earth-like elements include elements comprising include elements comprising a rare earth characteristic.

CLAIM 322 (New) A method according to any one of claims 272 to 301 or 302 further including forming said material .

CLAIM 323 (New) A method according to claim 303 further including forming said material.

CLAIM 324 (New) A method according to claim 304 further including forming said material.

CLAIM 325 (New) A method according to claim 305 further including forming said material.

CLAIM 326 (New) A method according to claim 306 further including forming said material.

CLAIM 327 (New) A method according to claim 307 further including forming said material.

CLAIM 328 (New) A method according to claim 308 further including forming said material.

CLAIM 329 (New) A method according to claim 309 further including forming said material.

CLAIM 330 (New) A method according to claim 310 further including forming said material.

CLAIM 331 (New) A method according to claim 311 further including forming said material.

CLAIM 332 (New) A method according to claim 312 further including forming said material.

CLAIM 333 (New) A method according to claim 313 further including forming said material.

CLAIM 334 (New) A method according to claim 314 further including forming said material.

CLAIM 335 (New) A method according to claim 315 further including forming said material.

CLAIM 336 (New) A method according to claim 316 further including forming said material.

CLAIM 337 (New) A method according to claim 317 further including forming said material.

CLAIM 338 (New) A method according to claim 318 further including forming said material.

CLAIM 339 (New) A method according to any one of claims 272 to 301 or 302 further including providing said material .

CLAIM 340 (New) A method according to claim 303 further including providing said material.

CLAIM 341 (New) A method according to claim 304 further including providing said material.

CLAIM 342 (New) A method according to claim 305 further including providing said material.

CLAIM 343 (New) A method according to claim 306 further including providing said material.

CLAIM 344 (New) A method according to claim 307 further including providing said material.

CLAIM 345 (New) A method according to claim 308 further including providing said material.

CLAIM 346 (New) A method according to claim 309 further including providing said material.

CLAIM 347 (New) A method according to claim 310 further including providing said material.

CLAIM 348 (New) A method according to claim 311 further including providing said material.

CLAIM 349 (New) A method according to claim 312 further including providing said material.

CLAIM 350 (New) A method according to claim 313 further including providing said material.

CLAIM 351 (New) A method according to claim 314 further including providing said material.

CLAIM 352 (New) A method according to claim 315 further including providing said material.

CLAIM 353 (New) A method according to claim 316 further including providing said material.

CLAIM 354 (New) A method according to claim 317 further including providing said material.

CLAIM 355 (New) A method according to claim 318 further including providing said material.

CLAIM 356 (New) An method comprising:

providing a composition comprising a transition metal, oxygen and any element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

wherein said composition posseses an electrical current passing through said composition while said composition is in said superconducting state.

CLAIM 357 (New). An method comprising:

providing a composition comprising a transition metal, oxygen and (1) a rare earth element or a rare earth-like element or a group III B element, and/or (2) an alkaline earth element or a Group IIA element, where said composition exhibits a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

wherein said composition posseses an electrical current passing through said composition while said composition is in said superconducting state.

CLAIM 358 (New) A method according to claim 356 wherein said transition metal is copper.

CLAIM 359 (New) A method according to claim 357 wherein said transition metal is copper.

CLAIM 360 (New). A method comprising:

providing a material, said material possesses a superconducting current flowing therein, said material comprising a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 361 (New) A method according to claim 360 further including maintaining said material at a temperature less than or equal to said to said T_C.

CLAIM 362 (New) A method according to claim 360 further including providing a source of current for said superconducting current.

CLAIM 363 (New) A method according to claim 361 further including providing a source of current for said superconducting current.

CLAIM 364 (New) A method according to claim 360 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 365 (New) A method according to claim 361 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 366 (New) A method according to claim 362 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 367 (New) A method according to claim 363 wherein said material is maintained at a temperature less than equal to said T_C and greater than or equal to 26°K.

CLAIM 368 (New) A method according to claim 360 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 369 (New) A method according to claim 361 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,.

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states, a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having

a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

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CLAIM 370 (New) A method according to claim 362 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 371 (New) A method according to claim 363 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth,
rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 372 (New) A structure according to claim 364 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 373 (New) A method according to claim 365 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 374 (New) A method according to claim 366 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 375 (New) A method according to claim 367 said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 376 (New) A method according to claim 360 wherein said transition metal is selected from the group consisting of copper, nickel and chromium.

CLAIM 377 (New) A method according to claim 360 wherein said rare earth-like elements include elements comprising a rare earth characteristic.

CLAIM 378 (New) A method according to claim 360 wherein said composition comprises one or more of Be, Mg, Ca, Sr, Ba, Ra, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 379 (New) A method according to claim 360 wherein said composition comprises one or more of one or more of of Be, Mg, Ca, Sr, Ba and Ra and one or more of Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 380 (New) A method according to claim 360 wherein said material can be made according to known principles of ceramic science.

CLAIM 381 (New) A method according to claim 360 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound.

CLAIM 382 (New) A method according to claim 360 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent copper compound.

CLAIM 383 (New) A method according to claim 360 wherein said material comprises a multiphase material wherein at least one phase exhibits superconductivity.

CLAIM 384 (New) A method according to claim 360 wherein said method is a method of operation of a structure selected from the group consisting of an apparatus, a device, a circuit and a combination.

CLAIM 385 (New) A method according to claim 360 wherein said material comprises at least one element selected from each of said first element group and said second element group.

CLAIM 386 (New) A method according to any one of claims 360 to 384 or 385 wherein said superconducting current is flowing in a structure selected from the group consisting of:

a power generation device,
an electrical power transmission device,
an electrical power transmission element,
a coil,
a magnet,
a plasma device,
a nuclear device,
a nuclear magnetic resonace device,
a nuclear magnetic imaging device,
a magnetic levitation device,
a power gerneation system,
a thermonuclear fusion device,
a switching device,
a Josephson junction device,
an electrical packaging device,
a circuit device,
a electronic instrumentation device,
a train,
a magnetic suceptomoter, and
a magnetometer.

CLAIM 387 (New) A method according to any one of claims 360 to 385 or 386 wherein said superconducting current is flowing in a coil comprised of said material.

CLAIM 388 (New) A method according to claim 387 wherein said material possesses substantially zero electrical resistance.

CLAIM 389 (New) A method according to claim 387 wherein said coil possesses substantially zero electrical resistance.

CLAIM 390 (New) A method according to claim 360 where in said superconducting current is flowing in a structure selected from the group consisting of a device, an apparatus, a circuit and a combination.

CLAIM 391 (New) A method according to any one of claims 360 to 389 or 390 wherein said material possesses substantially zero electrical resistance.

CLAIM 392 (New) A method according to any one of claims 360 to 385 or 386 wherein said material is part of a circuit element, said circuit element has an input capable of receiving an input current and an output capable of outputting an output current through substantially zero electrical resistance. between said input and said output.

CLAIM 393 (New) A method according to claim 392 wherein said material possesses substantially zero electrical resistance.

CLAIM 394 (New) A method according to any one of claims 360 to 368 or 369 wherein said superconducting current flows from an input of a circuit element to an output of said circuit element.

CLAIM 395 (New) A method according to claim 394 wherein said material possesses substantially zero electrical resistance.

CLAIM 396 (New) A method according to any one of claims 360 to 389 or 390 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be carrying said superconducting current.

CLAIM 397 (New) A method according to claim 396 wherein said material possesses substantially zero electrical resistance.

CLAIM 398 (New) A method according to claim 360 to 385 or 386 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 399 (New) A method according to claim 388 wherein said material possesses substantially zero electrical resistance.

CLAIM 400 (New) A method according to claim 394 wherein said material is part of said circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 401 (New) A method according to claim 400 wherein said material possesses substantially zero electrical resistance.

CLAIM 402 (New) A method according to any one of claims 360 to 385 or 386 wherein said material is part of a circuit element, said circuit element is capable of carrying a superconducting current flowing therein through substantially zero electrical resistance.

CLAIM 403 (New) A method according to claim 402 wherein said material possesses substantially zero electrical resistance.

CLAIM 404 (New) A method according to claim 387 wherein said coil is carrying said superconducting current flowing therein without a source providing for said superconducting current.

CLAIM 405 (New) A method according to any one of claims 360 to 385 or 386 wherein said superconducting current is flowing without a source providing for said superconducting current.

CLAIM 406 (New). A method comprising:

providing a material, said material possesses a superconducting current flowing therein, said material having a T_c greater than or equal to 26°K~~;~~

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 407 (New) A method comprising:

providing a material, said material possesses a superconducting current flowing therein, said material with a T_c greater than or equal to 26°K~~;~~

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 408 (New). A method comprising:

providing a material, said material posseses a superconducting current flowing therein, said material possessing a T_c greater than or equal to 26°K;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 409 (New) A method according to any one of claims 360, 406, 407 or 408 wherein said rare earth-like elements include elements comprising a rare earth characteristic.

CLAIM 410 (New) A method according to any one of claims 360 to 390 or 391 further including forming said material .

CLAIM 411 (New) A method according to claim 391 further including forming said material.

CLAIM 412 (New) A method according to claim 392 further including forming said material.

CLAIM 413 (New) A method according to claim 393 further including forming said material.

CLAIM 414 (New) A method according to claim 394 further including forming said material.

CLAIM 415 (New) A method according to claim 395 further including forming said material.

CLAIM 416 (New) A method according to claim 396 further including forming said material.

CLAIM 417 (New) A method according to claim 397 further including forming said material.

CLAIM 418 (New) A method according to claim 398 further including forming said material.

CLAIM 419 (New) A method according to claim 399 further including forming said material.

CLAIM 420 (New) A method according to claim 400 further including forming said material.

CLAIM 421 (New) A method according to claim 401 further including forming said material.

CLAIM 422 (New) A method according to claim 402 further including forming said material.

CLAIM 423 (New) A method according to claim 403 further including forming said material.

CLAIM 424 (New) A method according to claim 404 further including forming said material.

CLAIM 425 (New) A method according to claim 405 further including forming said material.

CLAIM 426 (New) A method according to claim 406 further including forming said material.

CLAIM 427 (New) A method according to any one of claims 272, 318, 319, 320, 360, 406, 407, or 408 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains.

CLAIM 428 (New) A method according to any one of claims 272, 318, 319, 320, 360, 406, 407, or 408 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains.

CLAIM 429 (New) An method comprising:

providing a structure comprising a composition comprising a transition metal, oxygen and any element selected from the group consisting of a Group II A element, a rare earth element and a Group III B element, where said composition is a mixed copper oxide having a non-stoichiometric amount of oxygen therein and exhibiting a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

an electrical current passing through said composition while said composition is in said superconducting state.

CLAIM 430 (New). An method comprising:

providing a structure comprising a composition comprising a transition metal, oxygen and (1) a rare earth element or a rare earth-like element or a group III B element, and/or (2) an alkaline earth element or a Group IIA element, where said composition exhibits a superconducting state at a temperature greater than or equal to 26°K;

maintaining said composition in said superconducting state at a temperature greater than or equal to 26°K; and

an electrical current passing through said composition while said composition is in said superconducting state.

CLAIM 431 (New) A method according to claim 429 wherein said transition metal is copper.

CLAIM 432 (New) A method according to claim 430 wherein said transition metal is copper.

CLAIM 433 (New). A method comprising:

providing a structure selected from the group consisting of a device, a circuit and an apparatus, said structure comprising a material comprising a T_c greater than or equal to 26°K;

said material comprises a property selected from the group consisting of being capable of carrying a superconducting current and exhibiting a substantially zero resistance to the flow of electrical current therethrough when in a superconducting state;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 434 (New) A method according to claim 433 further including providing a source of cooling said material at a temperature less than or equal to said to said T_C.

CLAIM 435 (New) A method according to claim 433 further including providing a source of current for said superconducting current.

CLAIM 436 (New) A method according to claim 434 further including providing a source of current for said superconducting current.

CLAIM 437 (New) A method according to claim 433 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 438 (New) A method according to claim 434 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 439 (New) A method according to claim 435 wherein said material is maintained at a temperature less than or equal to said T_C and greater than or equal to 26°K.

CLAIM 440 (New) A method according to claim 436 wherein said material is maintained at a temperature less than equal to said T_C and greater than or equal to 26°K.

CLAIM 441 (New) A method according to claim 433 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element,

or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 442 (New) A method according to claim 434 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 443 (New) A method according to claim 435 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 444 (New) A method according to claim 436 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth,
rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 445 (New) A structure according to claim 437 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 446 (New) A method according to claim 438 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,
a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 447 (New) A method according to claim 439 wherein said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,

a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,

a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 448 (New) A method according to claim 440 said material comprises at least one phase which comprises a property selected from the group consisting of:

a layered structure,

a layered crystalline structure,

a substantially layered structure,

a substantially layered crystalline structure,

a layered-like structure,

a layered-type structure,

a layered characteristic,

a layered perovskite structure,

a layered perovskite crystal structure,

a substantially layered perovskite structure,

a substantially layered perovskite crystal structure,

a perovskite structure,

a substantially perovskite structure,

a perovskite-like structure,

a perovskite type structure,

a structure comprising a perovskite characteristic,

a perovskite related structure,

a crystalline structure,

a layer-like crystalline structure,

a structure which is structurally substantially similar to an orthorhombic-tetragonal phase of said material,

a crystalline structure which enhances electron-phonon interactions to produce superconductivity,

a structure enhancing the number of Jahn-Teller polarons in said material,

a distorted crystalline structure characterized by an oxygen deficiency,

a structure comprising enhanced polaron formation,

a ceramic material,

a ceramic-like material,

a ceramic characteristic,

a ceramic type material,

a stoiciomeric oxygen content,

a non-stoiciomeric oxygen content,

a multivalent material,

a multivalent transition metal,

a transition metal element capable of exhibiting multivalent states,

a mixed valent material,

mixed valent ions,

mixed valent transition metal ions,

multivalent ions,

multivalent transition metal ions,

multivalent copper,

multivalent copper ions,

mixed valent copper,

mixed valent copper ions,

a ceramic-like material in the RE-AE-TM-O system, where RE is a rare earth or near rare earth element, AE is an alkaline earth element, TM is

a multivalent transition metal element having at least two valence states in said ceramic-like material, and O is oxygen wherein the ratio of the amounts of said transition metal in said two valence states being determined by the ratio RE: AE,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 1:1,

a mixed copper oxide material including an alkaline earth element (AE) and a rare earth or rare earth-like element (RE) where the ratio (AE,RE):Cu is substantially 2:1

a structure comprising a distorted octahedral oxygen environment,

a distorted orthorhombic crystalline structure,

an alkaline earth element substituted for at least one atom of said rare earth, rare earth-like element or rare earth characteristic in said material

a transition metal oxide,

a mixed transition metal oxide,

a copper oxide,

a mixed oxide,

a mixed oxide with alkaline earth doping,

a substituted transition metal oxide,

a mixed oxide with alkaline earth-like doping,

a copper oxide wherein said alkaline earth or alkaline earth element is atomically large with respect to copper,
a copper oxide doped with an alkaline earth element, alkaline earth like element, or an element with an alkaline earth characteristic where the concentration of said alkaline earth element, alkaline earth like element, or said element with an alkaline earth characteristic is near to the concentration of said alkaline earth element , alkaline earth like element or said element with an alkaline earth characteristic where the superconducting copper oxide phase in said material undergoes an orthorhombic to tetragonal structural phase transition,

a mixed copper oxide doped with an element chosen to result in Cu^{3+} ions in said material,

a doped transition metal oxide,

a copper oxide wherein at least one other element is an element which results in Cu^{3+} ions in said material,

a copper oxide wherein at least one other element is an element chosen to result in the presence of both Cu^{2+} and Cu^{3+} ions,

a substituted copper oxide exhibiting mixed valence states,

a superconductor being comprised of at least four elements, none of which is itself superconducting at a temperature greater than or equal to 26°K,

at least four elements, none of which is itself a superconductor,

a superconductor being comprised of said transition element which itself is not superconducting,

a superconductor being an oxide having multivalent oxidation states,
a transition metal oxide having substitutions therein, the amount of said substitutions being sufficient to produce sufficient electron-phonon interactions in said material that said material exhibits said superconductivity,

a crystalline mixed valent oxide having a layer-like structure,

at least one element in a nonstoichiometric atomic proportion,

a composition of the formula $Ba_xLa_{x-5}Cu_5O_Y$ wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition of the formula $BaLa_{5-x}Cu_5O_{5(3-y)}$, wherein x is from about 0.75 to about 1 and y is the oxygen deficiency resulting from annealing said composition at temperatures from about 540°C to about 950°C and for times of about 15 minutes to about 12 hours, said composition having a metal oxide phase which exhibits a superconducting state at a critical temperature greater than or equal to 26°K,

a composition wherein at least one element is in a nonstoichiometric atomic proportion;

a composition comprising a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound, and

combinations thereof.

CLAIM 449 (New) A method according to claim 433 wherein said transition metal is selected from the group consisting of copper, nickel and chromium.

CLAIM 450 (New) A method according to claim 433 wherein said rare earth-like elements include elements comprising a rare earth characteristic.

CLAIM 451 (New) A method according to claim 433 wherein said composition comprises one or more of Be, Mg, Ca, Sr, Ba, Ra, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 452 (New) A method according to claim 433 wherein said composition comprises one or more of one or more of of Be, Mg, Ca, Sr, Ba and Ra and one or more of Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu.

CLAIM 453 (New) A method according to claim 433 wherein said material can be made according to known principles of ceramic science.

CLAIM 454 (New) A method according to claim 433 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent transition metal compound.

CLAIM 455 (New) A method according to claim 433 wherein said material comprises a metallic, oxygen-deficient, perovskite-like, mixed valent copper compound.

CLAIM 456 (New) A method according to claim 433 wherein said material comprises a multiphase material wherein at least one phase exhibits superconductivity.

CLAIM 457 (New) A method according to claim 433 wherein said method is a method of operation of a capable of magnetic levitation.

CLAIM 458 (New) A method according to claim 433 wherein said material comprises at least one element selected from each of said first element group and said second element group.

CLAIM 459 (New) A method according to any one of claims 433 to 457 or 458 wherein said superconducting current is capable of flowing in a structure selected from the group consisting of:

a power generation device,
an electrical power transmission device,
an electrical power transmission element,
a coil,
a magnet,
a plasma device,
a nuclear device,
a nuclear magnetic resonace device,
a nuclear magnetic imaging device,
a magnetic levitation device,
a power gerneation system,
a thermonuclear fusion device,
a switching device,
a Josephson junction device,
an electrical packaging device,
a circuit device,
a electronic instrumentation device,
a train
a magnetic suceptomoter, and
a magnetometer.

CLAIM 387 460 (New) A method according to any one of claims 433 to 458 or 459 wherein said superconducting current is capable of flowing in a coil comprised of said material.

CLAIM 461 (New) A method according to claim 460 wherein said material possesses substantially zero electrical resistance.

CLAIM 462 (New) A method according to claim 460 wherein said coil possesses substantially zero electrical resistance.

CLAIM 463 (New) A method according to claim 433 where in said superconducting current is capable of flowing in a structure selected from the group consisting of a device, an apparatus, a circuit and a combination.

CLAIM 464 (New) A method according to any one of claims 433 to 462 or 463 wherein said material possesses substantially zero electrical resistance.

CLAIM 465 (New) A method according to any one of claims 433 to 458 or 459 wherein said material is part of a circuit element, said circuit element has an input capable of receiving an input current and an output capable of outputting an output current through substantially zero electrical resistance. between said input and said output.

CLAIM 466 (New) A method according to claim 465 wherein said material possesses substantially zero electrical resistance.

CLAIM 467 (New) A method according to any one of claims 433 to 441 or 442 wherein said superconducting is capable of flowing from an input of a circuit element to an output of said circuit element.

CLAIM 468 (New) A method according to claim 467 wherein said material possesses substantially zero electrical resistance.

CLAIM 469 (New) A method according to any one of claims 433 to 462 or 463 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be carrying said superconducting current.

CLAIM 470 (New) A method according to claim 469 wherein said material possesses substantially zero electrical resistance.

CLAIM 471 (New) A method according to claim 433 to 458 or 459 wherein said material is part of a circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 472 (New) A method according to claim 461 wherein said material possesses substantially zero electrical resistance.

CLAIM 473 (New) A method according to claim 467 wherein said material is part of said circuit element, said circuit element is designed for said circuit element to be capable of carrying said superconducting current.

CLAIM 474 (New) A method according to claim 473 wherein said material possesses substantially zero electrical resistance.

CLAIM 475 (New) A method according to any one of claims 433 to 458 or 459 wherein said material is part of a circuit element, said circuit element is capable of carrying a superconducting current flowing therein through substantially zero electrical resistance.

CLAIM 476 (New) A method according to claim 475 wherein said material possesses substantially zero electrical resistance.

CLAIM 477 (New) A method according to claim 460 wherein said coil is capable of carrying said superconducting current flowing therein without a source providing for said superconducting current.

CLAIM 478 (New) A method according to any one of claims 433 to 458 or 459 wherein said superconducting current is capable of flowing without a source providing for said superconducting current.

CLAIM 479 (New) A method comprising:

providing a structure selected from the group consisting of a device, a circuit and an apparatus, said structure comprising a material having a T_c greater than or equal to 26°K;

said material comprises a property selected from the group consisting of being capable of carrying a superconducting current and exhibiting a substantially zero resistance to the flow of electrical current therethrough when in a superconducting state;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 480 (New) A method comprising:

providing a structure selected from the group consisting of a device, a circuit and an apparatus, said structure comprising a material with a T_c greater than or equal to $26^{\circ}K$~~;~~

said material comprises a property selected from the group consisting of being capable of carrying a superconducting current and exhibiting a substantially zero resistance to the flow of electrical current therethrough when in a superconducting state;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 481 (New) A method comprising:

providing a structure comprising a material possessing a T_c greater than or equal to $26^{\circ}K$~~;~~

said material comprises a property selected from the group consisting of being capable of carrying a superconducting current and exhibiting a substantially zero resistance to the flow of electrical current therethrough when in a superconducting state;

said material comprises a transition metal, oxygen and at least one element selected from the group consisting of a first element group, a second element group and combinations thereof;

said first element group comprises rare earth elements, rare earth-like elements and Group IIIB elements, and

said second element group comprises alkaline earth elements and Group IIA elements.

CLAIM 482 (New) A method according to any one of claims 433, 479, 480 or 481 wherein said rare earth-like elements include elements comprising a rare earth characteristic.

CLAIM 483 (New) A method according to any one of 433, 479, 480 or 481 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains.

CLAIM 484 (New) A method according to any one of claims 433, 479, 480 or 481 wherein said superconducting current will substantially persist indefinitely unchanged in magnitude as long as superconductivity remains in a coil of said material.

CLAIM 485 (New) A method according to any one of claims 433, 479, 480 or 481 wherein said method comprises a method of fabricating said structure is a manufacturing method.